



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,829	05/13/2005	Kia Silverbrook	MJT009USNP	9037
24011 7590 03/21/2007 SILVERBROOK RESEARCH PTY LTD 393 DARLING STREET BALMAIN, 2041 AUSTRALIA			EXAMINER STEPHENS, JUANITA DIONNE	
			ART UNIT 2853	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE			MAIL DATE	DELIVERY MODE
3 MONTHS			03/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,829	SILVERBROOK, KIA	
	Examiner	Art Unit	
	Juanita D. Stephens	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Application filed 5/13/2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/24/06, 5/13/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgement is made of the Information Disclosure Statement filed 7/24/06 and 5/13/2005.

Specification

2. The disclosure is objected to because of the following informalities:

The "CROSS-REFERENCE TO RELATED APPLICATIONS" section is missing.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-7, 10, 19-21, 23, 24-25, 28, 37-39, 40-44, and 47 are rejected under 35 U.S.C. 102(b) as being anticipated Komuro (US 4,965,594).

Komuro discloses a method of ejecting a drop of an ejectable liquid from a printhead and a printer system incorporating said printhead, comprising: **1)** a plurality of nozzles (orifices **2)** (col 4, Ins 27-29), **2)** a plurality of nozzle chambers (formed between the orifices and heaters), **3)** a plurality of heater elements (11A, 21A and 31A) (col 4, Ins 27-31) disposed within each chamber, the heater elements within each chamber being formed on different respective layers (col 7, Ins 33-36, Ins 59-61, Ins 65-68; Fig. 2), **4)** wherein each heater element is arranged for being in thermal contact with a bubble

Art Unit: 2853

forming liquid (col 4, Ins 17-21), **5)** each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element (col 4, Ins 17-21), **6)** being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle, **7)** wherein the bubble forming liquid (ink) and the ejectable liquid (ink) are of common body of liquid (common to inkjet printheads utilizes heaters), **8)** wherein the heater elements (11A, 21A, 31A) in each chamber are differently sized to one another (col 3, Ins 39-40, In 61, Ins 66-68), **9)** ejecting drops of different volumes to one another (Table 1, col 4, Ins 36-40), and **10)** configured to receive a supply of the bubble forming liquid (supplied through 5 as shown on Fig. 3) at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point. Komuro further at least teaches that the heaters are formed in the form of a pattern by photolithography (col 3, Ins 39-41).

The method of claims 37-39, 40-44, and 47 are disclosed in Komuro as discussed above with respect to the apparatus

With respect to claims 5, 23, 40 and 41, no patentable weight is given to the matter in which the heater elements are formed (In re Thorpe, 777, F.2d 695, 227 USPQ 964 (Fed. Cir. 1985)).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4, 9, 13-15, 22, 27, 31-33, 46, and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komuro (US 4,965,594) in view of Silverbrook (US 6,019,457).

Komuro. discloses a method of ejecting a drop of an ejectable and a printer system incorporating a printhead (Fig. 4) comprising: **1)** a plurality of nozzles (orifices **2)** (col 4, Ins 27-29), **2)** a plurality of nozzle chambers (formed between the orifices and heaters), **3)** a plurality of heater elements (11A, 21A and 31A) (col 4, Ins 27-31) disposed within each chamber, the heater elements within each chamber being formed on different respective layers (col 7, Ins 33-36, Ins 59-61, Ins 65-68; Fig. 2), **4)** wherein each heater element is arranged for being in thermal contact with a bubble forming liquid (col 4, Ins 17-21), **5)** each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element (col 4, Ins 17-21), **6)** being configured to support the bubble forming liquid in thermal contact with each said heater element, and to support the ejectable liquid adjacent each nozzle, **7)** wherein the bubble forming

Art Unit: 2853

liquid (ink) and the ejectable liquid (ink) are of common body of liquid (common to inkjet printheads utilizes heaters), **8)** wherein the heater elements (11A, 21A, 31A) in each chamber are differently sized to one another (col 3, Ins 39-40, ln 61, Ins 66-68), **9)** ejecting drops of different volumes to one another (Table 1, col 4, Ins 36-40), and **10)** configured to receive a supply of the bubble forming liquid (supplied through 5 as shown on Fig. 3) at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point. Komuro further at least teaches that the heaters are formed in the form of a pattern by photolithography (col 3, Ins 39-41).

Komuro does not disclose **1)** a page-width printhead, **2)** wherein each heater has an actuation energy of less than 500 nanojoules (nJ), **3)** wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element, **4)** a structure that is formed by chemical vapor deposition (CVD), said nozzles being incorporated in the structure, and **5)** a structure which is less than 10 microns thick, said nozzles being incorporated in the structure. Silverbrook at least teaches a page-width printhead (col 2, Ins 19-20), wherein each heater (120) has an actuation energy of less than 500 nanojoules (nJ) (col 19, Ins 8-10), wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured

Art Unit: 2853

such that the point of collapse of a bubble formed thereby is spaced from the heater element (as shown by the shape of the heater element 120 in Fig. 10-12), a structure (overcoat 142) that is formed by chemical vapor deposition (CVD) said nozzles being incorporated in the structure (col 8, lns 65-66), and structure which is less than 10 microns thick, said nozzles being incorporated in the structure (col 9, lns 8-10). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Komuro with the structure as taught to be old by Silverbrook for the purpose of providing mechanical strength to resist the shock of exploding or collapsing vapor bubbles and providing protection against the external environment.

The method of claims 46, and 50-52 are disclosed in Komuro in view of Silverbrook as discussed above with respect to the apparatus.

7. Claims 8, 12, 18, 26, 30, 36, 45, 49, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komuro (US 4,965,594) in view of Kubby (5,706,041).

Komuro teaches the claimed invention, with the exception of **1)** wherein each heater element is in the formed of a suspended beam, **2)** wherein each heater element has two opposite sides and is configured such that said gas bubble formed by that heater element is formed at both of said sides of that heater element, and **3)** wherein each heater is substantially covered by a conformal protective coating, such that the coating is seamless. Kubby at least teaches wherein each heater element is in the formed of a suspended beam (col 3, lns 50-51) wherein each heater element has two opposite sides and is configured such that said gas bubble formed by that heater element is formed at both of said sides of that heater element (abstract; col 4, lns 47-65;

Art Unit: 2853

col 5, lns 8-16), and wherein each heater is substantially covered by a conformal protective coating (col 4, lns 11-17). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Komuro by providing the heating element as taught to be old by Kubby for the purpose of dissipating heat from the heating element more efficiently, preventing wasted heat from accumulating within the printhead.

The method of claims 45, 49, and 55 are disclosed in Komuro in view of Kubby as discussed above with respect to the apparatus.

8. Claims 11, 29, and 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Komuro (US 4,965,594) in view of Feinn et al. (US 6,543,879 B1).

Komuro teaches the claimed invention, with the exception of the areal density of the nozzles relative to the substrate surface exceeding 10,00 nozzles per square cm of substrate surface. Feinn et al. at least teaches the areal density of the nozzles relative to the substrate surface exceeding 10,00 nozzles per square cm of substrate surface (abstract; col 16, lns 11-13). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Komuro by providing the nozzle density as taught to be old by Feinn et al. for the purpose of improving resolution

The method of claims 48 is disclosed in Komuro in view of Feinn et al. as discussed above with respect to the apparatus.

Art Unit: 2853

9. Claims 16, 34, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komuro (US 4,965,594) in view of The Fabrication of Reliability Testing of Ti/TiN Heaters (DeMoor).

Komuro teaches the claimed invention, with the exception of each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50. DeMoor at least teaches that it is desirable to use a heater made of Ti/TiN (Ti has an atomic number of 22) in integrated MEMS systems (a thermal inkjet is such a system), because the material provide the advantages of CMOS fabrications (low cost and uniformity) in combination with a very high reliability (see Conclusion). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Komuro by providing the Ti/TiN heater as taught to be old by DeMoor, for the purpose of providing advantages of CMOS fabrication in combination with high reliability.

The method of claim 53 is disclosed in Komuro in view of DeMoor as discussed above with respect to the apparatus.

10. Claims 17, 35, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komuro (US 4,965,594 B1) in view of Yamashita et al. (US 5,969,005).

Komuro teaches the claimed invention, with the exception of wherein each heater element is configured for a mass of less than 10 nanograms. Yamashita et al. at least teaches that the ink is jetted at an output of from 1 to 70 nanograms per droplet to effect

Art Unit: 2853

recording (abstract, col 30, lns 29-32, lns 38-40; col 31, lns 18-22). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Komuro with the output of 1 to 70 nanograms per droplet to effect recording as taught to be old by Yamashita et al. for the purpose of providing a greater surface area of the droplet, thus strongly improving image quality.

The method of claim 54 is disclosed in Komuro in view of Yamashita et al. as discussed above with respect to the apparatus.

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex (Monday-Thursday 9:00 am -6:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

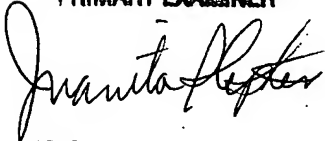
Application/Control Number: 10/534,829

Page 10

Art Unit: 2853

USPTO Customer Service Representative or access to the automated
information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JUANITA D. STEPHENS
PRIMARY EXAMINER

A handwritten signature in cursive script, appearing to read "Juanita Stephens", written in black ink.

JDS

March 18, 2007

Juanita D. Stephens
Primary Examiner
Art Unit 2853